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The Collembola of New Mexico. I. Podurinae and Hypogastrurinae¹

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This series records the first extensive survey of springtail insects in New Mexico and one of the first analyses of the ecological distribution of Collembola in so large and varied an area. It was made in conjunction with a study of the altitudinal distribution of several insect and arachnid groups directed by Dr. C. Clayton Hoff, Professor of Biology, University of New Mexico. Preplanned collections were made by Dr. Hoff with the help of David Bergstrom, Travis Everett, John Gorham, John Joseph, Dwain Parrack, and the author. Independent collections were contributed by Chester Richmond and Richard Spurrier. Specimens will be deposited with the Academy of Natural Sciences, Philadelphia, Pennsylvania.

Most collections were made using Berlese funnels to drive the insects from soil and litter into alcohol. Both field Berlese (using p-dichlorobenzene fumes) and laboratory Berlese (using light, heat, and dryness) funnels were employed. These devices are described in Hoff, 1959 and 1949. Hand-picking, sweeping, sifting, and light-trapping yielded additional collections. The sample was made from 19 counties, 45 microhabitats, and eighty 100-foot bands between 4,000 and 13,100 feet altitude. The

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plants referred to in the text are: alder (*Alnus*); aspen (*Populus tremuloides*); birch (*Betula fontinalis*); boxelder (*Acer negundo*); cottonwood (*Populus wislizeni*, *P. angustifolia*); fir (*Abies concolor*, *Pseudotsuga taxifolia*); greasewood (*Sarcobatus vermiculatus*); juniper (*Juniperus pachyphloea* and other *J.* spp.); maple (*Acer glabrum*, *A. grandidentatum*); mesquite (*Prosopis juliflora*); mahogany (*Cercocarpus*); oak (*Quercus Gambelii* and other *Q.* spp.); pine, bristlecone (*Pinus aristata*); pine, limber (*Pinus flexilis*); pine, yellow (*Pinus ponderosa*); pinyon (*Pinus edulis*); rabbit-brush (*Chrysothamnus*); sagebrush (*Artemisia*); salt-bush (*Atriplex canescens*); snowberry (*Symphoricarpos*); soapberry (*Sapindus Saponaria*); spruce (*Picea pungens*, *P. Engelmanni* and other *P.* spp.); sycamore (*Platanus Wrightii*); walnut (*Juglans*); willow (*Salix*); wolf-berry (*Lycium*); yucca (*Yucca glauca* and other *Y.* spp.).

None of the species of Collembola recorded in this part has been reported previously from New Mexico.

Order COLLEMBOLA Lubbock, 1870

Small (0.2 to 10 mm. long), wingless insects with holoblastic cleavage and no obvious metamorphosis; with scales, setae, or both; rarely with integumentary blisters (pseudocelli); antenna 4-7 segmented; eyes with 0-8 ommatidia; tibiotarsus with outer claw (unguis), usually inner claw (unguiculus), and often clavate tenent hairs; abdomen 6-segmented, sometimes appearing 3-7 segmented externally; usually with 3 pairs of abdominal appendages (collophore on Abd I, tenacula on Abd III, furcula on Abd IV). The collophore, unique and always present, is the typical structure of the order.

Suborder ARTHROPLEONA Börner, 1901

Body elongate, not subglobose; segmentation distinct (or last 2-3 segments ankylosed).

Family PODURIDAE Lubbock, 1870

Pronotum setaceous, not greatly reduced, of the same texture as the other segments.

Subfamily PODURINAE Börner, 1906

Head hypognathous; mouthparts chewing; postantennal organ, pseudocelli, and anal spines absent; furcula reaching beyond colophore. This subfamily contains a single species: *Podura aquatica* Linnaeus, 1758. The Indian *Podura himalayana* Baijal, 1955, belongs in the subfamily Hypogastrurinae. *P. aquatica*, not yet recorded from New Mexico, is one of the most cosmopolitan species of Collembola and probably occurs within the state.

Subfamily HYPOGASTRURINAE Börner, 1906

Head prognathous; mouthparts chewing; postantennal organ, eyes, and furcula usually present; pseudocelli absent; anal spines 0-2.

Genus *Hypogastrura* Bourlet, 1839

Furcula present; eyes 8 and 8; postantennal organ with 4-7 tubercles. The prior name *Achorutes* Templeton, 1835, is suppressed (ICZN Opinion 435, 1956).

Hypogastrura albamaculata sp. nov. Figure 1.

TYPE LOCALITY. Gallinas Canyon, NW of Las Vegas, San Miguel Co., NEW MEXICO; Berlese of yellow pine-fir litter, 7,500 ft., 6-vii-1953.

DESCRIPTION. Body without ankylosis; integument minutely tuberculate; yellow with mottled dark blue markings and a large number of laterodorsal opaque white spots; clothed by short setae; antenna shorter than head; Ant III and IV semiconfluent; postantennal organ with 4 peripheral tubercles; unguiculus minute, spine-like, almost entirely absent; tenent hairs 2,2,2; unguis with strong tooth; furcula short, not ankylosed, not reaching colophore; no dental spines or mucronal teeth;

anus ventroterminal; anal spines 2, stout, each about $\frac{1}{3}$ length of hind unguis; body length 0.7 mm.

DISCUSSION. This species is distinguished from other *Hypogastrura* by the rudimentary unguiculus, distinctive number of tenent hairs, and the striking opaque white spots.

***Hypogastrura banksi* Maynard, 1951.**

NEW MEXICO RECORDS. Berlese of (1) pinyon litter and soil, 7,000 ft., 10 mi N of Golden, Santa Fe Co., 11-vii-1952; and (2) rodent midden heap of fir cone scales, 10,300 ft., near Sandia Crest, Sandia Mts., Bernalillo Co., 10-ix-1951.

DISTRIBUTION. N. M., N. Y.

***Hypogastrura brevispinus* (Harvey, 1893).**

NEW MEXICO RECORDS. Berlese of (1) Engelmann spruce litter, timberline, 11,500 ft., Middle Mt., Taos Co., 10-ix-1953; (2) aspen-fir-spruce litter, 9,600 ft., W of La Mosca Peak, Mt. Taylor, Valencia Co., 20-vii-1953.

***Hypogastrura californica* (Bacon, 1914).**

NEW MEXICO RECORDS. Berlese of dry spruce-fir litter, 8,500 ft., near Tres Ritos, Taos Co., 7-vii-1953.

DISTRIBUTION. Cal., N. M.

***Hypogastrura glasgowi* (Folsom, 1916).**

NEW MEXICO RECORDS. Berlese of litter (aspen, oak, fir, pinyon, yellow pine, juniper); 7,200 to 10,600 ft.; Bernalillo, San Miguel, Lincoln, and Grant Co., Jun.-Oct., 1950-1953.

DISTRIBUTION. Ill., Iowa, N. M., N. Y., Texas, Ontario.

***Hypogastrura humi* (Folsom, 1916).**

NEW MEXICO RECORDS. Berlese of litter (aspen, oak, spruce, yellow pine, pinyon); 6,900 to 11,900 ft., Santa Fe, Bernalillo, Taos, San Miguel, and Valencia Co., May-Oct., 1951-1953.

DISTRIBUTION. Ill., N. M., N. Y., Ontario.

Hypogastrura macrospinata Maynard, 1951.

NEW MEXICO RECORDS. Berlese of grass roots, hollow tree roots, and litter (aspen, oak, fir, yellow pine), 7,200 to 8,400 ft., San Miguel, Bernalillo, and Lincoln Co., Jun.-Sep., 1950-1954.

DISTRIBUTION. N. M., N. Y.

Hypogastrura manubrialis (Tullberg, 1869).

NEW MEXICO RECORDS. Berlese of cottonwood litter, 5,000 ft., at Rio Grande just W of Bernalillo, Sandoval Co., 6-vi-1954.

DISTRIBUTION. N. M., N. Y., South America, Europe, Australasia.

Hypogastrura matura (Folsom, 1916).

NEW MEXICO RECORDS. Berlese of (1) soil and roots of grasses and herbs, (2) litter (aspen-fir, cottonwood): 5,000 to 12,700 ft., Rio Arriba, Taos, and Sandoval Co., Jun.-Sep., 1953-1954.

DISTRIBUTION. Cal., Ill., Ind., Iowa, Kans., Minn., N. M., N. Y., Texas, Utah, Mexico.

Hypogastrura minutissima (Mills, 1934), new combination.

Achorutes minutissimus Mills, 1934, Collembola of Iowa, p. 14.

NEW MEXICO RECORDS. Hand-picked from roots of dead Compositae, 5,300 ft., Kirtland Air Force Base, Bernalillo Co., 20-ix-1951.

DISTRIBUTION. Iowa, N. M.

Hypogastrura montana Maynard, 1951.

NEW MEXICO RECORDS. Berlese of spruce litter, timberline, 12,000 ft., Lake Peak, Santa Fe Co., 26-vi-1954.

DISTRIBUTION. N. M., N. Y.

Hypogastrura promatro (Wray, 1950).

NEW MEXICO RECORDS. Berlese and hand-picked samples from alpine grasses, spruce, fir, limber pine, pinyon, aspen, pine,

cottonwood, desert grasses, under rocks, and under dung; 5,300 to 11,200 ft., Taos, Santa Fe, Sandoval, Valencia, Torrance, and Socorro Co., Jul.-Sep., 1951-1954.

DISTRIBUTION. Idaho, N. M., Utah.

Hypogastrura punctata (Coleman, 1941), new combination, neotype designation.

Achorutes punctatus Coleman, 1941, Jour. Ent. Zool., 33: 6.

The types of this species were accidentally destroyed (Coleman, 1941, p. 6). The New Mexico specimens agree perfectly with Coleman's description, and figures, and a neotype and co-neotypes are hereby designated.

NEOTYPE LOCALITY. Sandia Mts., Bernalillo Co., New Mexico; Berlese of fir-aspen litter, 9,200 ft., 14-vii-1951.

DESCRIPTION. Body without ankylosis; integument minutely tuberculate; white to gray with conspicuous black spots; clothed by short setae; antenna shorter than head; postantennal organ with 4 tubercles; unguis without teeth; unguiculus well-developed; no tenent hairs or dorsal dental teeth; anal spines 2, small; body length 1.3 mm.

DISCUSSION. This species is distinguished from other *Hypogastrura* by the well-developed unguiculus, lack of tenent hairs, and the conspicuous black spots.

DISTRIBUTION. Cal., N. M.

Hypogastrura tigrina (Harvey, 1900).

NEW MEXICO RECORDS. Berlese of spruce litter, 10,900 ft., near Santa Fe Ski Run, Santa Fe Co., date unknown.

DISTRIBUTION. Maine, N. M., N. Y.

Hypogastrura tullbergi (Schaffer, 1900).

NEW MEXICO RECORDS. Berlese of (1) fir litter, 11,200 ft., Mt. Taylor, Valencia Co., 21-vii-1953; (2) alder litter, 8,400 ft., just W of Cowles, San Miguel Co., 31-vii-1954.

DISTRIBUTION. Mass., N. M., N. Y., Europe.

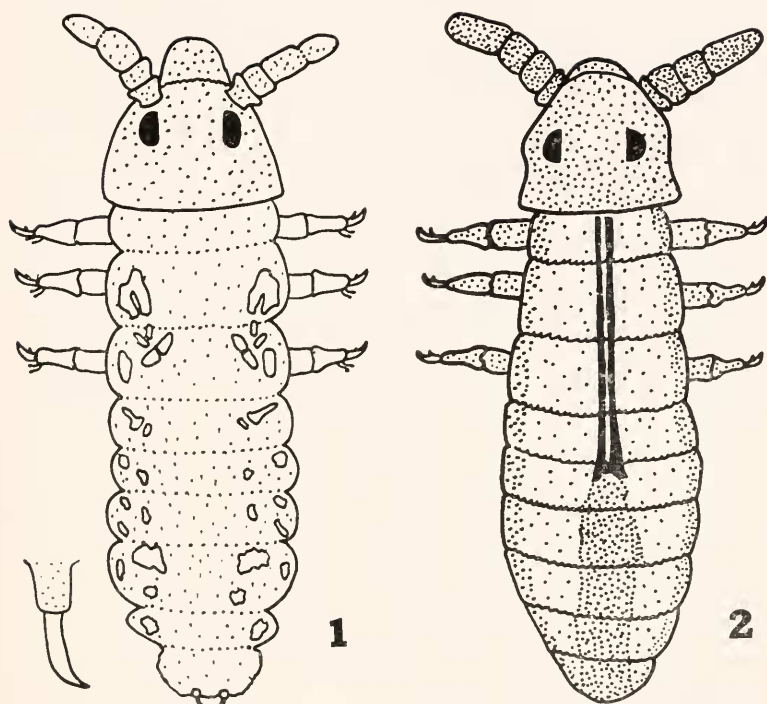


FIG. 1. *Hypogastrura albamaculata* sp. nov., dorsal view of holotype with detail of left anal spine.

FIG. 2. *Xenylla neomexicana* sp. nov., dorsal view of holotype.

Hypogastrura uniunguiculatus (Tullberg, 1869).

NEW MEXICO RECORDS. Berlese of (1) pinyon litter, 7,500 ft., just N of Santa Fe, Santa Fe Co., 5-ix-1952; (2 and 3) fir litter, 10,000 ft., 8-vii-1950 and spruce-fir litter, 8,600 ft., 23-vi-1951; Sandia Mts., Bernalillo Co.

DISTRIBUTION. Ill., N. M., Europe.

Hypogastrura viatica (Tullberg, 1872).

NEW MEXICO RECORDS. Berlese, sifting, and hand-picked collections from alpine grasses, yellow pine litter, under rocks;

9,000 to 12,300 ft.; Taos, Santa Fe, Mora, and Valencia Co., Jun.-Oct., 1953-1954; commonly associated with ants.

DISTRIBUTION. Cal., N. M., Europe, Arctica, South America, Antarctica.

Genus **Xenylla** Tullberg, 1869

Furcula present, not reaching collophore; eyes 5 and 5; post-antennal organ absent; unguiculus absent.

Xenylla carolinensis Wray, 1946.

NEW MEXICO RECORDS. Berlese of oak litter: (1) 8,200 ft., Hyde Park, Santa Fe Co., 28-viii-1952; (2) 7,500 ft., just NE of Grants, Valencia Co., 6-viii-1952.

DISTRIBUTION. N. M., N. C.

Xenylla collis Bacon, 1914.

NEW MEXICO RECORDS. Berlese of (1) clumps of alpine vegetation, 12,400 ft., Santa Fe Baldy, Santa Fe Co., 17-vii-1954; (2) walnut litter, 6,900 ft., Water Canyon, W of Socorro, Socorro Co., 10-vii-1954.

DISTRIBUTION. Cal., N. M.

Xenylla humicola (Fabricius, 1780).

NEW MEXICO RECORDS. Berlese of juniper litter, 6,900 ft., SE corner of Sandoval Co., 30-i-1952.

DISTRIBUTION. Mass., N. M., N. Y., Ontario, Europe.

Xenylla neomexicana sp. nov. Figure 2.

TYPE LOCALITY. Just N of Red River Village, Taos Co., New Mexico; Berlese of rotten coniferous stump, 8,700 ft., 31-viii-1954.

DESCRIPTION. Body not ankylosed; integument granular; clothed by short setae; dark blue on yellow; yellow intersegmental bands, sometimes indistinct; mid-dorsal longitudinal blue strip extending from posterior edge of head to posterior Abd

III; antenna shorter than head; postantennal organ absent; eyes 5 and 5; eyepatches usually dark, but sometimes pale or absent; dens and mucro nearly confluent; furcula small, not reaching colophore; 2 exceedingly minute anal spines; body length 0.6 mm.

Xenylla welchi Folsom, 1916.

NEW MEXICO RECORDS. Berlese of (1) grass clumps under fir, 8,300 ft., Hyde Park, Santa Fe Co., 16-vii-1954; (2 and 3) 7,000 ft., Juniper-pinyon and pinyon litter, Sandia Mts., 24-ii-1952, Bernalillo Co.

DISTRIBUTION. Cal., Ill., Iowa, Kans., Md., N. M., Penna., Utah, Costa Rica, Europe.

SUMMARY

The New Mexico sample reported in this series of papers represents 19 counties, 45 microhabitats, and 80 100-foot altitudinal bands. Collections were by Berlese funnel, hand-picking, sweep net, sifter, and light trap. The probable occurrence of *Podura aquatica* in New Mexico and the taxonomic placement of *P. himalayana* are discussed. Record is made of 17 species of *Hypogastrura* including *H. albamaculatus* sp. nov., and *H. punctata*, new combination. Neotypes are designated for *H. punctata*. Record is made of 5 species of *Xenylla* including *X. neomexicana* sp. nov. Ecological data are presented for all 22 species.

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The Establishment of *Brachymeria intermedia* (Nees) in North America. (Hymenoptera, Chalcididae)

From 1905 onward into the early 1930's *Brachymeria intermedia* (Nees) was repeatedly introduced from Europe into New England, for control of the gypsy moth. Apparently all these attempts to colonize it failed. In 1935 Dowden (Jour. Agr. Res., 50: 509) stated, "it has never become established in spite of the large colonies of adults that have been liberated."

While working over the unidentified North American *Brachymeria* material in the U. S. National Museum collection, however, I found a single female specimen of *intermedia* that had been reared in Massachusetts in 1942. The data associated with this specimen are: Marion, Mass., reared from pupa of *Cacoecia*, Aug. 1, 1942, H. J. Franklin. This specimen is a rather small one, but it agrees in all diagnostic characters with European specimens of *intermedia* and with the long series of specimens that were preserved from the *intermedia* cultures at the Gypsy Moth Laboratory, Melrose Highlands, Massachusetts.

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